UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/580,343	05/25/2000	Brigitte Benage	D-6387	8093

7590 06/10/2004

Raymond D Thompson
Uniroyal Chemical Company Inc
World Headquarts
Middlebury, CT 06749

EXAMINER	
THEXTON, MATTHEW	

ART UNIT	PAPER NUMBER
1714	

DATE MAILED: 06/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/580,343	BENAGE ET AL.	
	Examiner	Art Unit	
	Matthew A. Thexton	1714	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 May 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,6-14,16-28,30-44,47,49-57 and 59-123* is/are pending in the application.

4a) Of the above claim(s) *See Continuation Sheet* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,6,9,16,17,30-44,49,52,59,60,73,75-89,122 and 123* is/are rejected.

7)☒ Claim(s) *14 and 57* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2004 April 29 has been entered.

Text of US Code Might Not Be Cited

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims Status

Claims 1, 4, 6-14, 16-28, 30-44, 47, 49-57, and 59-123 are pending.

Claims 2, 3, 5, 15, 29, 45, 46, 48, and 58 have been canceled.

Applicant has previously elected methods, thus claims 90-121 are withdrawn as being directed to non-elected invention.

Applicant has previously elected DNBP for component A, and 4-oxo-TEMPO for component B.

Claims 4, 13, 18-28, 47, 56, and 61-71 have been amended to further add an inhibitor (variously either another hydrogen donor or an electron acceptor), however this is considered non-elected since components A and B were elected as compounds and

not mixtures (cf. claims 72 and 74 which were directed to mixtures for component A or B but were not elected). Accordingly, these amended claims are withdrawn.

Claims 7, 8, 10, 11, 12, 50, 51, 53-55, 72, and 74 are withdrawn as being directed to non-elected species.

By virtue of amendments to claims 1 and 44, claims 14 and 57 have been rendered objectionable under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.

Claims 1, 6, 9, 16, 17, 30-44, 49, 52, 59, 60, 73, 75-89, 122, and 123 are generic to the elected inventions.

Claim Objections

Claims 14 and 57 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

The structures set forth for component A in claims 14 and 57 are not within the scope of the structures set forth in the claims from which they depend.

Claim Rejections - 35 USC § 102

or, in the alternative, under 35 U.S.C. 103(a)

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 6, 9, 44, 49, 52, 73, 75, 122, and 123 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Sutoris et al. (WO 97/46504-A1, as evidenced by US 6143205-A).

Claims 1, 6, 9, and 122 require adding the elected inhibitor, DNBP, to a mixture of vinyl aromatic polymer (which was formed in the presence of an inhibitor of the class nitroxyl) and vinyl aromatic monomer. These claims encompass methods in which the forming of polymer may have occurred in the presence of DNBP or not, thus the adding of DNBP appears to encompass adding make-up DNBP inhibitor to a stream which has had the inhibitor(s) depleted, such as in a distillation/purification stream.

Claims 44, 49, 52, 73, 75, and 123 require adding the elected inhibitor, DNBP, and a nitroxyl inhibitor to a mixture of vinyl aromatic polymer (which was formed in the presence of an inhibitor of the class nitroxyl) and vinyl aromatic monomer. These claims encompass methods in which the forming of polymer may have occurred in the presence of DNBP or not, thus the adding of DNBP plus nitroxyl appears to encompass adding make-up DNBP/nitroxyl inhibitor to a stream which has had the inhibitor(s) depleted, such as in a distillation/purification stream.

The reference (hereinafter, the US reference will be relied upon) discloses as polymerization inhibitor for ethylenically unsaturated monomers the mixture of DNBP (column 9, line 32, examples) with nitroxyl compounds such as 4-oxo-TEMPO (column 8, line 31). The inhibitor formulation is disclosed to be added to a mixture containing monomer and polymer (item 2. of Examples) in steady state, thus apparently satisfying the limitations of the claims.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

1. Claims 30-43, and 76-89 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sutoris et al. (WO 97/46504-A1, as evidenced by US 6143205-A).

The reference (hereinafter, the US reference will be relied upon) suggests using the mixture in purification or distillation processes, including separately and including reduced pressure techniques (column 10, lines 4-22).

The reference discusses the problems of unwanted reactions (polymerization) of monomers in production and purification processes of ethylenically unsaturated monomers. To the extent that this disclosure has not stated the conditions of the claims 30-43 and 76-89, such conditions are considered either inherent or obvious to one of ordinary skill in the art at the time of the invention when the disclosure is practiced as described. Official notice is taken of the requirement in applicant's claims to the presence of impurities arising from monomer production and/or purification; such are notoriously well known and inevitable, as acknowledged by applicant in the background and the references cited in the background.

2. Claims 16, 17, 59 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sutoris et al. (WO 97/46504-A1, as evidenced by US 6143205-A) as applied to claims 1 and 44 above, and further in view of Odian and Quintens et al. (US 5372924) and Rosenkranz et al. (US 4053504).

Claims 16 and 59 require the addition of a transition metal.

Claims 17 and 60 further specify the metal to be copper. Odian discloses the use of copper chloride as polymerization inhibitor for ethylenically unsaturated monomers (Table 3-9, page 263). Quintens discloses copper naphthenate as polymerization inhibitor for curable compositions containing ethylenically unsaturated components (paragraph bridging columns 6 and 7). Rosenkranz discloses copper naphthenate as polymerization inhibitor for ethylenically unsaturated monomers (paragraph bridging columns 2 and 3). Individually these references establish that it is known to use copper ion (i.e., in salt form) as polymerization inhibitor for ethylenically unsaturated monomers. It would have been obvious to one of ordinary skill in the art at the time of the invention to employ copper (salt or ion) as an additional polymerization inhibitor for ethylenically unsaturated monomers because combining additives for their known functions, even in combinations for the same function, is routine.

3. Claims 1, 6, 9, 30-44, 49, 52, 73, 75-89, 122, and 123 are rejected under 35 U.S.C. 103(a) as being unpatentable over Winter et al. (US 5254760) alone or in view of Foord (US 2225471) and Hyde et al. (US 5910232-A).

Claims 1, 6, 9, and 122 require adding the elected inhibitor, DNBP, to a mixture of vinyl aromatic polymer (which was formed in the presence of an inhibitor of the class nitroxyl) and vinyl aromatic monomer; with claims 30-43 having additional limitations: that there are impurities, that the impurities arise from the monomer production or purification, that the polymer is either soluble or insoluble with respect to the monomer, that the monomers are undergoing purification by distillation. These claims encompass methods in which the forming of polymer may have occurred in the presence of DNBP

or not, thus the adding of DNBP appears to encompass adding make-up DNBP inhibitor to a stream which has had the inhibitor(s) depleted, such as in a distillation/purification stream.

Claims 44, 49, 52, 73, 75, and 123 require adding the elected inhibitor, DNBP, and a nitroxyl inhibitor to a mixture of vinyl aromatic polymer (which was formed in the presence of an inhibitor of the class nitroxyl) and vinyl aromatic monomer; with claims 76-89 having additional limitations: that there are impurities, that the impurities arise from the monomer production or purification, that the polymer is either soluble or insoluble with respect to the monomer, that the monomers are undergoing purification by distillation. These claims encompass methods in which the forming of polymer may have occurred in the presence of DNBP or not, thus the adding of DNBP plus nitroxyl appears to encompass adding make-up DNBP/nitroxyl inhibitor to a stream which has had the inhibitor(s) depleted, such as in a distillation/purification stream.

The reference discloses DNBP as polymerization inhibitor for ethylenically unsaturated monomers (column 4, line 12) further formulated with nitroxyl compounds (column 3, lines 3-14 and 32). The inhibitor formulation is disclosed to be added to distillation purification process (paragraph bridging columns 4 and 5). The reference discloses tests (columns 5 and 6) in which the inhibitor formulation is demonstrated to reduce the amount of formed polymer impurity, but clearly does not eliminate it. Accordingly, when following the suggestion to add DNBP to the distillation column, it would necessarily and inherently be added to polymer which has already formed in the presence of the nitroxyl additive. It would have been obvious to one of ordinary skill in

the art at the time of the invention in view of the reference disclosure that the polymerization inhibitor formulation may be added to monomer or to monomer in the presence of polymer impurity.

The reference discusses the problems of unwanted reactions (polymerization) of monomers in production and purification processes of ethylenically unsaturated monomers. To the extent that this disclosure has not stated the conditions of the claims 30-43 and 76-89, such conditions are considered either inherent or obvious to one of ordinary skill in the art at the time of the invention when the disclosure is practiced as described. Official notice is taken of the requirement in applicant's claims to the presence of impurities arising from monomer production and/or purification; such are notoriously well known and inevitable, as acknowledged by applicant in the background and the references cited in the background.

The Foord (column 2, lines 6+) and Hyde (column 1, line 42 to column 2, line 14) references are cited to establish the fact that inhibitors are well known to be of true inhibitor function or retardation function. It would have been obvious to one of ordinary skill in the art at the time of the invention in view of the known properties of polymerization retarders to add such to mixtures of monomer and polymers (formed in the presence of true inhibitors) in order to slow any further polymerization. The Hyde reference specifically notes that DNBP is a retarder. The Foord reference discloses that nitro groups are effective retarding additives (page 4, column 1, lines 1-5), which would suggest to one of ordinary skill in the art that DNBP would be at least an effective

retarder, notwithstanding others effects from the other constituents which are also disclosed to have either inhibiting or retarding effects (page 4, column 1, lines 6-31).

4. Claims 16, 17, 59 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Winter et al. (US 5254760) alone or in view of Foord (US 2225471) and Hyde et al. (US 5910232-A) as applied to claims 1 and 44 above, and further in view of Odian and Quintens et al. (US 5372924) and Rosenkranz et al. (US 4053504).

Claims 16 and 59 require the addition of a transition metal.

Claims 17 and 60 further specify the metal to be copper. Odian discloses the use of copper chloride as polymerization inhibitor for ethylenically unsaturated monomers (Table 3-9, page 263). Quintens discloses copper naphthenate as polymerization inhibitor for curable compositions containing ethylenically unsaturated components (paragraph bridging columns 6 and 7). Rosenkranz discloses copper naphthenate as polymerization inhibitor for ethylenically unsaturated monomers (paragraph bridging columns 2 and 3). Individually these references establish that it is known to use copper ion (i.e., in salt form) as polymerization inhibitor for ethylenically unsaturated monomers. It would have been obvious to one of ordinary skill in the art at the time of the invention to employ copper (salt or ion) as an additional polymerization inhibitor for ethylenically unsaturated monomers because combining additives for their known functions, even in combinations for the same function, is routine.

Citation of Pertinent Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Ferrell (US 4670131) discloses use of nitroxide stable free radical to reduce fouling due to polymerization of olefins in distillation, extraction, extractive distillation, countercurrent extraction, hydrotreating, hydrofining, thermal treatments, and the like.

Keil et al. (EP 0697386-A1, as evidenced by US 5888356) discloses inhibition of polymerization of vinyl monomers by adding an inhibitor formulation comprising one of two specific stable nitroxyl free radicals compounds as an inhibitor and one of two nitrosophenol compounds as a retarder.

Lartigue-Peyrou (WO 98/45385-A1, as evidenced by USPTO obtained translation) discloses formulations employing polymerization inhibitor and retarder, where the retarder is for example DNBP.

Citation of Pertinent Other Art

Tanizaki et al. (JP 2001-039901-A, as evidenced by JPO machine translation) discloses processes of suppressing polymerization of styrenes by adding one or more piperidines, including 4-oxo-TEMPO, and a nitrophenol, including DNBP. This document was filed prior to the date of Applicant's patent application, but published after that date.

Benage et al. (US 6653414-B2) claims inhibitor formulations and methods of using comprising inhibitors non-elected in Applicant's claims.

Eldin (US 6639026-B2) claims inhibitor formulations and methods of using comprising inhibitors elected in Applicant's claims.

Geelan et al. (US 6344560-B1) pertains to non-elected inventions directed to formulations.

Response to Arguments

Applicant's arguments filed 2004 May 5 have been fully considered but they are not persuasive.

Applicant urges (pages 19-20, bridging paragraph) that the claims are directed to a new use, i.e., anti-growth agents. As discussed in the statements of rejection hereinabove, the use of retarders is recognized and DNBP is known to perform in this way.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew A. Thexton whose telephone number is 571-272-1125. The examiner can normally be reached on Monday-Friday, 9:30 to 6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasudevan S Jagannathan can be reached on 571-272-1119. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

M. A. Thexton

Matthew A. Thexton
Primary Examiner
Art Unit 1714